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| **Scientific knowledge Year 7** | **Cells-**  Identify what cells are.  Describe how you use a microscope to see and draw cells.  Identify the different parts of the cell and describe what they do.  Identify the similarities and differences of plant and animal cells?  Describe how different animal and plant cells are specialised to do their job.  Describe what diffusion is and what it allows to happen.  State what the term unicellular means and identify how are these organisms are different to human cells.  State what the term multicellular means and describe how are these types of organisms are organised. | **States of matter-**  Describe the properties of the different states of matter.  Identify the similarities and differences, between solids, liquids and gases.  Use the particle model to show different changes of state.  Describe the transitions between the different states of matter.  Define diffusion and describe how particles can move by this method.  Identify the difference between chemical and physical changes.  Draw what mixtures and compounds look like at a particle level.  Identify the different ways that we can separate mixtures. | **Forces and their effects-**  Identify the different types of forces.  Describe how forces happen.  Use force arrows to show the size and direction of forces.  Describe what happens when forces are applied to an object.  Identify how to measure forces and the units used.  Identify what moments are.  Describe how pressure changes in fluids.  Be able to calculate the pressure exerted on the ground.  Describe Hooke’s law and explain what it shows. | | **The Human body-including reproduction.**  Identify the structure and describe the function of the human skeletomuscular system.  Identify the structure and describe the function of the human digestive system.  Describe what a healthy diet consists of and explain why we need to eat a healthy balanced diet.  Name the parts and identify the functions of the different parts of the female and male reproductive system.  What is the menstrual cycle  Identify how gametes are specialised to perform their function.  Describe the main stages of development from fertilisation to birth.  Describe how the developing baby is protected, and kept alive.  Identify the different stages of labour and describe what happens at each stage | **The periodic table-**  Know what the chemical symbols are and how to write them correctly.  Describe why Mendeleev ordered his periodic table as he did.  Name the main parts of the periodic table correctly.  Identify the different physical and chemical properties of elements in group, 1,7 and 0.  Describe or draw the atomic model that Dalton envisaged.  Know the differences between atoms elements and compounds.  Identify if a substance is pure. | **Acids and alkalis-**  Identify what Acids and alkalis are.  Know what the pH scale is and what it measures.  Describe the process of neutralisation. | **Electricity-**  Describe what causes static electricity.  Plot and draw a magnetic field.  Make an electromagnet, identify how these are used.  Draw and interpret circuit diagrams correctly.  Describe what electric current is and what is it measured in.  Identify how current behaves in series and parallel circuits.  Describe what potential difference is and what is it measured in.  Identify how potential difference behaves in series and parallel circuits.  Identify the difference in resistance between conducting and insulating components. | **The interdependence of organisms in an ecosystem-** Show the interdependence of organisms in an ecosystem, by drawing food chains and webs.  Describe plant reproduction both sexual and asexual, and the importance in human food production.  Describe how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.  Describe the importance of maintaining biodiversity and how gene banks are used to preserve hereditary material. | |  |  |
| **Scientific knowledge year 8** | **Motion-**  What is speed and how can you calculate it?  How would you rearrange the speed equation to find the distance or time a journey takes?  How can you tell just from looking at a graph how fast or how far an object has travelled?  What is relative motion and how can you calculate it? | **Genetics and evolution-**  What is genetic material and how is it transmitted from one generation to the next?  How are different species different to each other?  What is continuous and discontinuous variation?  What is natural selection and how does it occur?  How can changes in the environment cause a reduction in the number of a species or possibly an extinction? | **Energy stores and transfers-** What are the names of the most common energy stores?  What are the physical processes and mechanisms that energy can be transferred by?  What is the difference between energy and power?  How do you draw and interpret energy transfer diagrams?  How do you calculate energy change and Energy efficiency?  How can the use of simple machines make moving heavy items easier?  How does heat transfer occur? | | **Chemistry**  How do you show chemical reactions as the rearrangement of atoms?  How do you represent chemical reactions using formulae and using equations?  What is combustion, thermal decomposition, oxidation and displacement reactions?  Describe the reactions of acids with metals to produce a salt plus hydrogen and the reactions of acids with alkalis to produce a salt plus water.  What are catalysts and what do they do?  What are endothermic and exothermic reactions?  What is the order of metals and carbon in the reactivity series?  How is carbon used in obtaining metals from metal oxides?  What are the properties of ceramics, polymers and composites? | **Photosynthesis**  What is photosynthesis and how does it happen?  What happens to the products of photosynthesis?  What happens to the glucose that plants produce when they photosynthesise?  Why is almost all life on Earth dependent on Plants?  How are leaves adapted for photosynthesis?  How do plants gain minerals and water, that are needed for photosynthesis and building of other substances,from the soil? | **Gas exchange and respiration.**  What is gas exchange and which parts of the human body are involved in it? How are these different in plants and insects?  How are these parts adapted to be efficient at gas exchange?  What is breathing and how does it occur?  How can you measure lung volume?  How can exercise, asthma, and smoking impact on the human gas exchange system?  What is aerobic respiration?  Where does it occur and why is it important to us?  What is anaerobic respiration? How is this different to aerobic respiration in humans, and why does it occur?  What happens when microorganisms respire anaerobically? | **Light and sound waves**  How do water waves travel?  How are sound waves propagated, how are they measured and how do they travel?  What happens when sound waves meet different types of media?  What are the different auditory ranges of humans and animals?  What can waves be used for?  What are the similarities and differences between light waves and waves in matter?  What happens when light waves meet different type of media?  How are different colours of light produced? What is the electromagnetic spectrum and how are different colours of light produced**?** | **The Rock Cycle.**  What is the Earth made up of?  What is the rock cycle and how are igneous, sedimentary and metamorphic rocks formed?  Why do we need to reduce, recycle and reuse resources?  What is the carbon cycle? How has human activity changed the levels of carbon dioxide in the atmosphere? How has/does this impact on climate? | | **Space**  How do you calculate your weight on different planets and stars?  What is a light year?  What impacts on the amount of gravitational forces between Earth and Moon, and between Earth and Sun?  What type of celestial body is our Sun?  How do we get different seasons? |  |
| **Working scientifically -Through the content across all three disciplines, and year 7 and 8 pupils should be taught to:** | **Scientific attitudes**  Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility  Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review  Evaluate risks. | | | **Experimental skills and investigations-**  Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience.  Make predictions using scientific knowledge and understanding.  Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.  Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety.  Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements.  Apply sampling techniques. | | | **Analysis and evaluation-**  Apply mathematical concepts and calculate results.  Present observations and data using appropriate methods, including tables and graphs.  Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions  Present reasoned explanations, including explaining data in relation to predictions and hypotheses.  Evaluate data, showing awareness of potential sources of random and systematic error.  Identify further questions arising from their results. | | | **Measurement-**  Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature.  Use and derive simple equations and carry out appropriate calculations.  Undertake basic data analysis including simple statistical techniques. | | |